

23 April 2015

Our ref: GENZTAUC13086AF-AH

The Lakes (2012) Ltd  
C/- Harrison Grierson Consultants Ltd  
Level 1 Harrison Grierson House  
141 Cameron Road  
Tauranga

Attention: Tony Mills

Dear Tony,

**Re: Palisade Retaining Wall and Staircase Certification, The Lakes Subdivision Stage 3**

## 1. Introduction

As shown on the attached Figure 1, The Lakes (2012) Ltd has constructed a pedestrian walkway to connect Stage 2 and Stage 3 of the Lakes subdivision. Coffey has provided geotechnical input for two elements of the walkway. The first of these is a timber and concrete staircase that climbs the 1V:2.5H batter. This staircase was designed by Harrison Grierson Consultants Ltd (HGCL) and is also intended to function as an overland stormwater flow path. Coffey provided geotechnical recommendations to support this design<sup>1</sup>. The second element is an approximately 12m long timber pole 'palisade' retaining wall to support part of the walkway. This wall was designed by Coffey<sup>2</sup>.

At the request of Mr Tony Mills, Coffey has overseen the construction of the staircase and retaining wall to ensure that our design recommendations were carried out. This letter summarises the results of our inspections and supervision and is intended to be provided to the Tauranga City Council as part of the certification of the completed works. A Producer Statement 4 (PS4 – Construction Supervision) is attached for the retaining wall.

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<sup>1</sup> Coffey letter, 'RE: Proposed Stormwater Pipe Alignments, the Lakes Subdivision, Pycs Pa (Revision 1)' dated 18 December 2013.

<sup>2</sup> Coffey letter, 'RE: Retaining Wall Design for Walkway, The Lakes Subdivision Stage 3 (Revision 1)', dated 17 March 2015.

## **2. Site Description**

The walkway follows an original farm track from Stage 3 across a steep to very steep natural slope before descending down an approximately 30m high, 1V:2.5H cut batter to Stage 2. The contours and layout of the site are shown on Figure 1. The natural slope below the walkway is covered with grass and has been planted with various native species. The 1V:2.5H batter is sparsely covered with grass and has been mulched where grass has not become established. This batter has also been planted.

A series of photos showing the staircase, retaining wall and surrounding site are appended to this letter.

## **3. Staircase**

### **3.1. Coffey Recommendations**

As mentioned, the staircase was designed by HGCL with geotechnical recommendations provided by Coffey. These recommendations are summarised as follows:

1. Each step should be benched into the ground surface (after topsoil has been stripped) to ensure the steps are not built on a sloping and potentially unstable surface;
2. The vertical timber elements below every third step should be drilled at least 1.0m below the level of the step below and concreted in place;
3. The horizontal element supporting each third step should be extended through the timber siding of the walkway so that it is fully supported by the adjacent deepened upright.

### **3.2. Site Inspections**

The staircase site was first inspected by Coffey on the 15<sup>th</sup> of February 2015. At this time the contractor had stripped the staircase alignment of topsoil and loose soils and started benching each step into the cleared ground as recommended. An approximately 300mm deep trench had been excavated down each side of the walkway to accept the vertical timber posts. Boreholes had been drilled from the base of this trench at intervals to receive the deeper vertical posts per recommendation 2 above. These holes were at least 1.0m deep below the base of the trench as recommended.

Subsequent, approximately weekly inspections were carried out during construction. Photo 1 (attached) was taken on the 3<sup>rd</sup> of March 2015 and shows the vertical posts and horizontal rails supporting each step installed over approximately 25% of the alignment. Photos 2 and 3 show the completed staircase on 10<sup>th</sup> of April 2015. In photo 3 the horizontal timber rails supporting each third step can be seen extending through the vertical side of the staircase and being supported on the adjacent vertical post per recommendation 3 above.

Based on our observations and measurements during construction, it is considered that the staircase has been constructed in accordance with our recommendations.

## 4. Palisade Retaining Wall

### 4.1. Coffey Design and Recommendations

The design elements and recommendations from Coffey's design report for the palisade retaining wall are listed below:

1. The existing fill and loose soil below the wall should be removed to a depth of up to 1.0m under Coffey supervision.
2. A series of 450mm diameter pile holes should be drilled at 1.0m centres along the wall alignment. The number of posts and extent of the wall will need to be confirmed by Coffey and marked on site before construction.
3. 4.2m long, 225mm SED timber posts should be concreted into each hole as illustrated. The upper portion of each post is to be left un-concreted to allow the timber rails to be installed.
4. To reduce the risk of slope movement during construction, the holes should be drilled and posts installed in a 'hit and miss' fashion with each second or third post being installed and concreted before the intervening holes are drilled.
5. Timber rails should be fitted and coach-bolted to the posts. The removed soil should then be replaced with well compacted earth fill to reduce the exposed height of the retaining wall to a maximum of 0.5m.
6. The cavity behind the rails and between the posts should be filled with well compacted earth fill (locally sourced volcanic ash silt) and capped with 100mm of concrete. The concrete should be formed into a raised lip to direct stormwater away from the retaining wall and slope.
7. Finally, a kick rail consisting of approximately 200mm x 100mm timber beams (e.g. railway sleepers) should be coach bolted along the top of the wall and across the posts.

### 4.2. Site Inspections

The palisade wall site was first inspected by Coffey on the 5<sup>th</sup> of March 2015. The existing fill and loose soils along the wall length had been removed at this time per the above recommendations and the first post holes were being drilled. Measurements confirmed the holes were drilled to the correct depth. The soils encountered in the boreholes were consistent with those described in the design report.

Following the first inspection, Coffey inspected the site on an approximately weekly basis during construction. Photos 4, 5 and 6 show the partially constructed wall on the 10<sup>th</sup> of March 2015. The posts have been installed and the first timber rails are being fitted. Measurements at this time indicated the posts were of the correct dimensions. As shown in this photo the post holes had not been filled with concrete to the base of the rails as shown on the design drawings. The contractor was instructed to completely fill the holes with concrete after the last (bottom) rail had been fitted. Subsequent inspections indicated this was done.

Once the horizontal rails were fitted the contractor backfilled the void behind the wall with locally sourced clean fill (silt). An initial inspection by Coffey indicated this fill had not been adequately compacted, although this may also be due to surface softening following heavy rain. The contractor was instructed to re-compact the fill and it is understood this was carried out.

Photos 7 and 8 show the completed wall. The timber rails have been fitted as recommended and the top of the wall has been 'capped' with concrete to prevent stormwater infiltrating behind the wall. The timber kick rail has also been fitted.

To avoid the need for a fall protection barrier, Coffey's design report recommended that once the wall was finished, well compacted soil or topsoil be placed against the exposed face to reduce the exposed height of the wall to less than 1.0m. This work had not been done at the time of the attached photos but has since been completed and inspected by Coffey.

Based on our observations and inspections, it is considered that the palisade retaining wall has been constructed in accordance with the design and Coffey's instructions.

## 5. Conclusions

It is considered that the staircase and palisade retaining wall described in this letter have been constructed in accordance with Coffey's recommendations and accepted engineering practice.

The finished retaining wall complies with Coffey's design and is suitable for its intended purpose. The staircase has also been constructed in accordance with our geotechnical recommendations. It should however be understood that the 'civil' design of the staircase, including its proposed use as an overland flow path, has been completed by HGCL and has not been reviewed by Coffey.

For and on behalf of Coffey



**Rob Telford**  
Senior Engineering Geologist

Reviewed by



**KAH-WENG HO**  
Principal Geotechnical Engineer  
CPEng, MIPENZ

## Attachments

Figure 1 – Site Plan  
Construction Photos 1 to 8  
PS4 – Construction Supervision (retaining wall only)

## Important information about your **Coffey Report**

As a client of Coffey you should know that site subsurface conditions cause more construction problems than any other factor. These notes have been prepared by Coffey to help you interpret and understand the limitations of your report.

### **Your report is based on project specific criteria**

Your report has been developed on the basis of your unique project specific requirements as understood by Coffey and applies only to the site investigated. Project criteria typically include the general nature of the project; its size and configuration; the location of any structures on the site, other site improvements; the presence of underground utilities; and the additional risk imposed by scope-of-service limitations imposed by the client. Your report should not be used if there are any changes to the project without first asking Coffey to assess how factors that changed subsequent to the date of the report affect the report's recommendations. Coffey cannot accept responsibility for problems that may occur due to changed factors if they are not consulted.

### **Subsurface conditions can change**

Subsurface conditions are created by natural processes and the activity of man. For example, water levels can vary with time, fill may be placed on a site and pollutants may migrate with time. Because a report is based on conditions which existed at the time of subsurface exploration, decisions should not be based on a report whose adequacy may have been affected by time. Consult Coffey to be advised how time may have impacted on the project.

### **Interpretation of factual data**

Site assessment identifies actual subsurface conditions only at those points where samples are taken and when they are taken. Data derived from literature and external data source review, sampling and subsequent laboratory testing are interpreted by geologists, engineers or scientists to provide an opinion about overall site conditions, their likely impact on the proposed development and recommended actions. Actual conditions may differ from those inferred to exist, because no professional, no matter how qualified, can reveal what is hidden by

earth, rock and time. The actual interface between materials may be far more gradual or abrupt than assumed based on the facts obtained. Nothing can be done to change the actual site conditions which exist, but steps can be taken to reduce the impact of unexpected conditions. For this reason, owners should retain the services of Coffey through the development stage, to identify variances, conduct additional tests if required, and recommend solutions to problems encountered on site.

### **Your report will only give preliminary recommendations**

Your report is based on the assumption that the site conditions as revealed through selective point sampling are indicative of actual conditions throughout an area. This assumption cannot be substantiated until project implementation has commenced and therefore your report recommendations can only be regarded as preliminary. Only Coffey, who prepared the report, is fully familiar with the background information needed to assess whether or not the report's recommendations are valid and whether or not changes should be considered as the project develops. If another party undertakes the implementation of the recommendations of this report there is a risk that the report will be misinterpreted and Coffey cannot be held responsible for such misinterpretation.

### **Your report is prepared for specific purposes and persons**

To avoid misuse of the information contained in your report it is recommended that you confer with Coffey before passing your report on to another party who may not be familiar with the background and the purpose of the report. Your report should not be applied to any project other than that originally specified at the time the report was issued.

## Important information about your **Coffey** Report

### Interpretation by other design professionals

Costly problems can occur when other design professionals develop their plans based on misinterpretations of a report. To help avoid misinterpretations, retain Coffey to work with other project design professionals who are affected by the report. Have Coffey explain the report implications to design professionals affected by them and then review plans and specifications produced to see how they incorporate the report findings.

### Data should not be separated from the report\*

The report as a whole presents the findings of the site assessment and the report should not be copied in part or altered in any way.

Logs, figures, drawings, etc. are customarily included in our reports and are developed by scientists, engineers or geologists based on their interpretation of field logs (assembled by field personnel) and laboratory evaluation of field samples. These logs etc. should not under any circumstances be redrawn for inclusion in other documents or separated from the report in any way.

### Geoenvironmental concerns are not at issue

Your report is not likely to relate any findings, conclusions, or recommendations about the potential for hazardous materials existing at the site unless specifically required to do so by the client. Specialist equipment, techniques, and personnel are used to perform a geoenvironmental assessment.

Contamination can create major health, safety and environmental risks. If you have no information about the potential for your site to be contaminated or create an environmental hazard, you are advised to contact Coffey for information relating to geoenvironmental issues.

### Rely on Coffey for additional assistance

Coffey is familiar with a variety of techniques and approaches that can be used to help reduce risks for all parties to a project, from design to construction. It is common that not all approaches will be necessarily dealt with in your site assessment report due to concepts proposed at that time. As the project progresses through design towards construction, speak with Coffey to develop alternative approaches to problems that may be of genuine benefit both in time and cost.

### Responsibility

Reporting relies on interpretation of factual information based on judgement and opinion and has a level of uncertainty attached to it, which is far less exact than the design disciplines. This has often resulted in claims being lodged against consultants, which are unfounded. To help prevent this problem, a number of clauses have been developed for use in contracts, reports and other documents. Responsibility clauses do not transfer appropriate liabilities from Coffey to other parties but are included to identify where Coffey's responsibilities begin and end. Their use is intended to help all parties involved to recognise their individual responsibilities. Read all documents from Coffey closely and do not hesitate to ask any questions you may have.

\* For further information on this aspect reference should be made to "Guidelines for the Provision of Geotechnical information in Construction Contracts" published by the Institution of Engineers Australia, National headquarters, Canberra, 1987.



Existing Orchards

Lakes Subdivision Stage 3

Lakes Subdivision Stage 2

CONCRETE WALKWAY TO STAGE 3

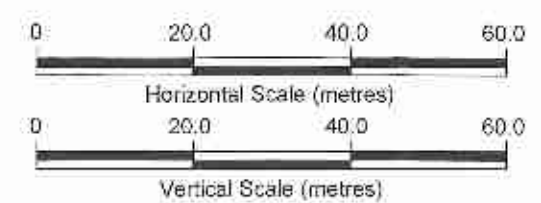
CONCRETE WALKWAY

PALLISADE RETAINING WALL

STAIRCASE

- NOTES:
1. Contours from survey information provided by Harrison Grierson Consultants Limited
  2. The locations of features have not been surveyed and are approximate only

revision	rev	description	drawn	approved	date



drawn	SWH
approved	RBT
date	17/04/2015
scale	1:1000
original size	A3



client	THE LAKES (2012) LTD		
project	THE LAKES SUBDIVISION PYES PA		
title	PALLISADE WALL AND STAIRCASE CERTIFICATION SITE PLAN		
project no:	GENZTAUC13086AF	figure no:	01
		rev:	0

Photo 1 (dated 3 March 2015) - Stairs under construction, looking north-east



Photo 2 (dated 10 April 2015) - Completed stairway, looking east





Photo 3 (dated 10 April 2015) -  
Completed stairway



Photo 4 (dated 10 March 2015) - Palisade retaining wall under construction, looking west



Photo 5 (dated 10 March 2015) - Timber posts at 1.0m centre to centre spacing



Photo 6 (dated 10 March 2015) -  
225mm diameter timber posts



Photo 7 (dated 10 April 2015) -  
Completed palisade retaining wall,  
looking west



Photo 8 (dated 10 April 2015) -  
Completed palisade retaining wall,  
looking east





Building Code Clause(s) ...B1.....

# PRODUCER STATEMENT – PS4 – CONSTRUCTION REVIEW

(Guidance notes on the use of this form are printed on page 2)

ISSUED BY: ..... Coffey Geotechnics (NZ) Ltd.....  
*(Construction Review Firm)*

TO: ..... The Lakes (2012) Ltd.....  
*(Owner/Developer)*

TO BE SUPPLIED TO: ..... Tauranga City Council.....  
*(Building Consent Authority)*

IN RESPECT OF: ... Construction supervision for timber pole palisade retaining wall.....  
*(Description of Building Work)*

AT: ... 239 Lakes Boulevard.....  
*(Address)*  
..... LOT ..... 2..... DP ... 474511... SO .....

..... Coffey Geotechnics (NZ) Ltd..... has been engaged by..... The Lakes (2012) Ltd.....  
*(Construction Review Firm)*

To provide  CM1  CM2  CM3  CM4  CM5 *(Engineering Calculations)* or  observation as per agreement with owner/developer

or  other ..... Construction supervision and certification of timber pole palisade retaining wall..... services  
*(Extent of Engagement)*

in respect of clause(s) ..... B1/VM4..... of the Building Code for the building work described in

documents relating to Building Consent No. .... NA..... and those relating to

Building Consent Amendment(s) Nos. .... NA..... issued during the

course of the works. We have sighted these Building Consents and the conditions of attached to them.

Authorised Instructions / variations(s) No. .... NA..... (copies attached)

or by the attached Schedule  have been issued during the course of the works.

On by the basis of  this  these review(s) and information supplied by the contractor during the course of the works and on behalf of the firm undertaking this Construction Review, I believe on reasonable grounds that  All  Part only of the building works have been completed in accordance with the relevant requirements of the Building Consent and Building Consent Amendments identified above, with respect to Clause(s) ... B1/VM4..... of the Building Code. I also believe on reasonable grounds that the persons who have undertaken this construction review have the necessary competency to do so.

I, Kah-Weng Ho..... am:  CPEng No. 45290.....  
*(Name of Construction Review Professional)*

Reg Arch No. ....

I am a Member of:  IPENZ  NZIA and hold the following qualifications: BE (Hons) Civil.....

The Construction Review Firm issuing this statement holds a current policy of Professional Indemnity Insurance no less than \$200,000\*.

The Construction Review Firm is a member of ACENZ:

SIGNED BY Kah-Weng Ho..... ON BEHALF OF ... Coffey Geotechnics (NZ) Ltd.....

Date: 22 April 2015..... Signature:.....

*Note: This statement shall only be relied upon by the Building Consent Authority named above. Liability under this statement accrues to the Design Firm only. The total maximum amount of damages payable arising from this statement and all other statements provided to the Building Consent Authority in relation to this building work, whether in contract, tort or otherwise (including negligence), is limited to the sum of \$200,000\*.*

This form is to accompany **Forms 6 or 8 of the Building (Form) Regulations 2004** for the issue of a Code Compliance Certificate.